

## Abstract

It is intended to efficiently nitride an extremely thin oxide film or oxynitride film of 0.4 nm or less thickness while minimizing a film increase. In particular, oxygen radicals are generated through oxygen radical generating unit so as to oxidize a silicon substrate with the generated oxygen radicals, thereby forming an oxide film on the silicon substrate, and further nitrogen radicals are generated through nitrogen radical generating unit so as to nitride the surface of the oxide film, thereby forming an oxynitride film.